

Fiberoptic bronchoscopy-guided percutaneous tracheostomy in an infant

Bir bebekte fiberoptik bronkoskopi eşliğinde perkütan trakeostomi

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ABSTRACT

Percutaneous tracheostomy is a routine procedure in adults; however, it is rarely used in children. In this article, we present a two-month-old infant weighing 3,500 g who was performed bronchoscopy-guided percutaneous tracheostomy.

Keywords: Bronchoscopy; infant; tracheostomy.

A tracheostomy is a procedure performed on critically ill patients to facilitate weaning from the ventilator, nursing care, and patient comfort. It is a common procedure in intensive care units because it prevents some complications associated with prolonged tracheal intubation.^[1] A percutaneous tracheostomy is a cost-effective alternative to a surgical tracheostomy because of the lower postoperative risk for bleeding and infection. The use of bronchoscopic guidance with this procedure the number of intraoperative complications, such as paratracheal false passages, pneumothoraces, and tracheal lesions, has been reduced.^[2] According to our survey of the literature, although a surgical tracheostomy was carried out on a child weighing 1,500 g, no fiberoptic bronchoscopy-guided percutaneous tracheostomies have been performed on a low-body-weight patient. Herein, we present the case of an infant who underwent this procedure.

CASE REPORT

A two-month-old boy with a body weight of 3,500 g was born at the 35th gestational week and had an APGAR score of 8/9. He had a syndromic face and spastic extremities and was intubated after being born because of respiratory failure. He was subsequently diagnosed with arthrogryposis multiplex congenital, a rare disorder characterized by multiple joint contractures that can also include muscle weakness and fibrosis. For

ÖZ

Perkütan trakeostomi erişkinlerde olağan bir işlemdir; öte yandan, çocuklarda nadiren kullanılır. Bu yazıda, bronkoskopi eşliğinde perkütan trakeostomi uygulanan iki aylık 3500 g ağırlığında bir bebek sunuldu.

Anahtar sözcükler: Bronkoskopi; bebek; trakeostomi.

two months, the infant could not tolerate extubation; hence, a tracheostomy was scheduled.

Under general anesthesia, the patient was extubated, and a laryngeal mask with an inner diameter of 5.3 mm was used to keep his airway open. He was then positioned so that his neck was hyperextended. The surgical field was prepared with 0.1% octenidine dihydrochloride and 2% phenoxyethanol, and a Olympus P180 3.8 mm pediatric fiberoptic bronchoscope (Olympus Corporation, Tokyo, Japan) with a diameter of 2.6 mm was inserted through the laryngeal mask. Ventilation was continued manually throughout the bronchoscopy without any complications. The secretions were aspirated by the bronchoscope, and then the cricothyroid membrane and trachea were palpated and manually immobilized between the first and second fingers to ensure the placement of the needle into the first tracheal space. After the needle was introduced into the trachea (Figure 1a), a guidewire was inserted through the needle (Figure 1b). Following multiple dilatations (Figure 1c), a 3.5 French (F) tracheostomy cannula was inserted (Figure 1d). The entire procedure, from the puncture of the trachea until the insertion of the cannula, was performed via bronchoscopic guidance through the laryngeal mask (Figures 2a and b). Additionally, no peri- or postoperative complications were noted in the patient.



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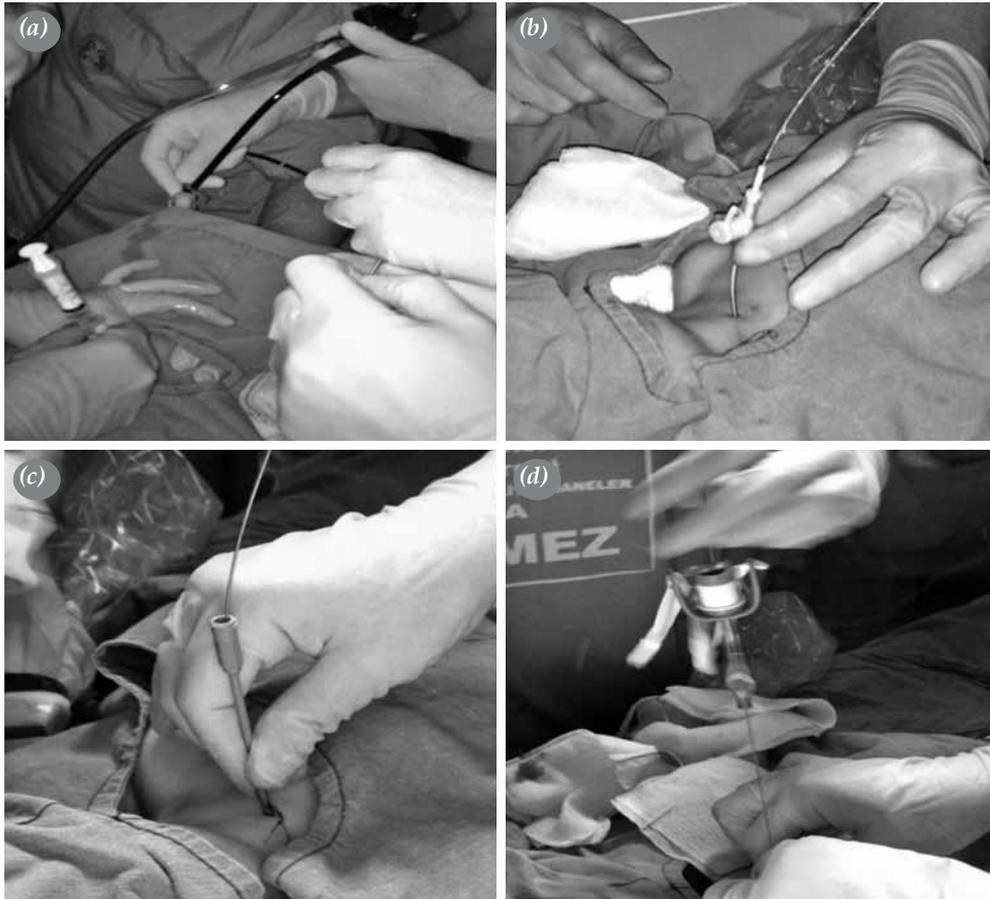


Figure 1. (a) The needle was introduced into the trachea. (b) The guidewire was inserted through the needle. (c) Multiple dilatations were performed. (d) The tracheostomy cannula was inserted.

DISCUSSION

A tracheostomy is a procedure that prevents some complications related to prolonged tracheal intubation in critically ill patients. A percutaneous tracheostomy

is a cost-effective alternative to a surgical tracheostomy with a lower postoperative risk of bleeding. In addition, wound infections occur less frequently with a percutaneous tracheostomy. To perform this type of

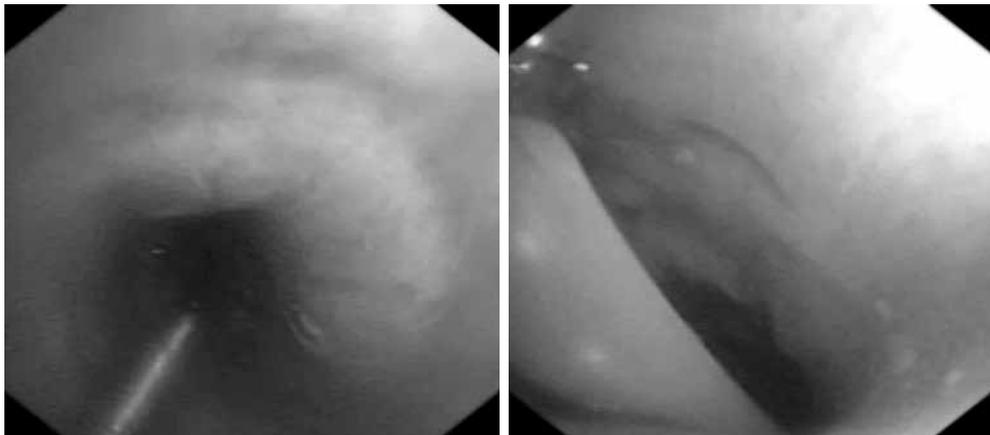


Figure 2. The entire procedure was performed under fiberoptic bronchoscopic guidance through the laryngeal mask.

tracheostomy, various techniques such as the multiple dilator (MDT), guidewire-dilating forceps (GWDF), translaryngeal, single-step dilation (SSDT), rotational dilation and balloon dilation techniques have been described in the literature. According to the meta-analysis by Cabrini et al.^[1] made up of 1,130 patients, the GWDF, MDT and SSDT were similar with regard to safety and the rate of success. Furthermore, Johnson et al.^[3] and Byhahn et al.^[4] reported no statistically significant differences in the complication rates between MDT and SSDT.

The addition of bronchoscopic guidance has increased the safety of this procedure and also may prevent complications like the creation of a false passage, posterior tracheal wall damage, pneumothoraces, and subcutaneous emphysema. However, the presence of the bronchoscope and dilators inside the lumen of the trachea may produce airway obstruction and lead to hypoventilation, hypercarbia, and hypoxemia. The use of a laryngeal mask airway as an alternative to the endotracheal tube has been proven to be satisfactory during percutaneous tracheostomies.^[2]

Performing tracheostomies is more hazardous in children than adults, with infants and neonates being at the greatest risk for complications. In addition, the operation is more technically demanding for both the surgeon and anesthetist because the pediatric trachea is smaller and more pliable. Moreover, surgical access is limited by the relatively short neck and large head that is typical of infants, and since the diameter of the bronchoscope is much thinner, the quality of vision is poor, which makes the aspiration of secretions more difficult than in older patients. Currently, the most common indication for a tracheostomy in children is upper airway obstruction because of the acquired subglottic stenosis along with the need for prolonged positive pressure ventilation in those with neuromuscular disorders.

The initial description of the percutaneous tracheostomy method did not include the use of fiberoptic bronchoscopes, but toward the end of the 1980s, they were incorporated to both guide the procedure and make it safer. In their meta-analysis of 23 studies, Romero et al.^[5] examined the incidence of complications related to percutaneous tracheostomies, both with and without fiberoptic bronchoscopic guidance, and found that in the blind percutaneous tracheostomy group, the complication rate was 16.8%, whereas it was 8.3% in the bronchoscopic-guided group ($p < 0.0001$).

However, the use of endoscopic guidance is still up for debate. Some authors believe that a bronchoscopy

is an unnecessary procedure that increases the cost of the procedure and causes carbon dioxide retention by increasing the pressure in the airways. However, two larger trials compared percutaneous tracheostomies with and without bronchoscopic guidance and found complication rates of 9.5% and 19%, respectively.^[6,7]

Because the complication rates associated with fiberoptic bronchoscopic-guided tracheostomies are lower, it is reasonable to use this technique in pediatric patients and even in low-body-weight infants. To the best of our knowledge, our case involved the youngest case with the lowest body weight who has undergone this procedure.

In conclusion, although surgical tracheostomies have been successfully performed on low-body-weight infants, fiberoptic bronchoscopy-guided percutaneous tracheostomies also provide an effective and safe alternative technique that can be utilized for this patient population.

Declaration of conflicting interests

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